The mission of this program is to train the next generation of scientists in climate dynamics and related fields. Through a comprehensive grounding in coursework, our students learn about how the atmosphere, ocean, and land surface work together to determine the climate. In collaboration with internationally-known scientists, students conduct independent work to further our understanding of climate, how it varies, and how much of it we can predict. Tools in the program include cutting-edge climate models, superb computing facilities, sophisticated statistical techniques, and comprehensive data sets. Our graduates have gone on to work at top laboratories and universities.

Understanding climate variability and predictability poses difficult mathematical, computational, and observational questions that have generated increasing intellectual excitement in recent years. Climate variability has important ramifications for society, from planning for next year’s electrical demand and forecasting agricultural production to answering complex questions involving long-term change in global climate, sea level, and biodiversity. While it is impossible to predict day-to-day weather more than a few weeks in advance, progress in predicting El Niño supports the idea that seasonal averages of temperature, rainfall, and other factors may be at least partly predictable months or even years in advance. Likewise, there is a strong scientific basis for predicting long-term changes in global climate due to changing greenhouse gas concentrations.

Climate dynamics faculty members have a blend of expertise in dynamics, statistics, and computational methods. They are heavily involved with national and international collaborations. Faculty members and students work closely with scientists at the Center for Ocean-Land-Atmosphere Studies (COLA) (http://cola.gmu.edu/cola.html), a national leader in climate modeling.

Faculty research focuses on the areas of climate prediction and predictability, climate variability, coupled ocean-atmosphere-land dynamics, and dynamical systems and retrospective analysis. Recent research topics include predictability of weather and climate; modeling of the complex climate system; El Niño dynamics; monsoons; atmosphere-ocean interaction; land-climate interaction; decadal climate variability; ocean circulation theory; and climate change.

This has been designated a Green Leaf program.
CLIM 751  Predictability and Prediction of Weather and Climate  3

Total Credits  15

Core Computational Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSI 690</td>
<td>Numerical Methods</td>
<td>3</td>
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<tr>
<td>CLIM 715</td>
<td>Numerical Methods for Climate Modeling</td>
<td>3</td>
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<tr>
<td>CLIM 762</td>
<td>Statistical Methods in Climate Research</td>
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Total Credits  9

Climate Seminar

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CLIM 991</td>
<td>Climate Dynamics Seminar (taken three times)</td>
<td>3</td>
</tr>
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</table>

Total Credits  3

Electives

Select 21 credits of graduate-level electives, including CLIM courses and other relevant courses as approved by the graduate coordinator.  1

Total Credits  21

1 Including up to 3 credits of CLIM 796 or CLIM 996.

Qualifying Exams

After completing the fundamental climate science courses, students take a two-part qualifying exam that includes core and specialty components. The core component is administered by an examination committee. After successfully completing the core component exam, students take the exam for the specialty component, which is administered by the dissertation committee that students typically form by the spring semester of their second year.

Advancement to Candidacy

Following successful completion of both parts of the qualifying exam, students present a written dissertation proposal to the committee. Students may enroll in CLIM 998 Doctoral Dissertation Proposal to complete this effort. After approval of the dissertation proposal and completion of all non-dissertation program requirements, students are formally advanced to doctoral candidacy.

Dissertation Research and Defense

After approval of the dissertation proposal, students are formally advanced to doctoral candidacy and produce the dissertation while taking CLIM 999 Doctoral Dissertation. The degree's requirements will be fulfilled upon completion of the required coursework and approval of a dissertation that makes an original and significant contribution to the field.

No more than 24 combined credits from CLIM 998 Doctoral Dissertation Proposal and CLIM 999 Doctoral Dissertation may be applied toward satisfying doctoral degree requirements, with no more than 21 credits of CLIM 998 Doctoral Dissertation Proposal.